

# SEQUENCE LISTING

<110> Asakura, Akira  
Hoshino, Tatsuo  
Ojima, Setsuko  
Shinjoh, Masako  
Tomiyaama, Noribumi

<120> Novel Alcohol/Aldehyde Dehydrogenases

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<140> 09/470,667

<141> 1999-12-22

<150> US 08/934,506

<151> 1997-09-19

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<170> PatentIn version 3.1

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<212> DNA

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Leu Ala Asn Pro Pro Ala Gly Glu Trp Ile Ser Tyr Gly Gln Asn Gln  
 35 40 45

Glu Asn Tyr Arg His Ser Pro Leu Thr Gln Ile Thr Thr Glu Asn Val  
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Gly Gln Leu Gln Leu Val Trp Ala Arg Gly Met Gln Pro Gly Lys Val  
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Gln Val Thr Pro Leu Ile His Asp Gly Val Met Tyr Leu Ala Asn Pro  
 85 90 95

Gly Asp Val Ile Gln Ala Ile Asp Ala Lys Thr Gly Asp Leu Ile Trp  
 100 105 110

Glu His Arg Arg Gln Leu Pro Asn Ile Ala Thr Leu Asn Ser Phe Gly  
 115 120 125

Glu Pro Thr Arg Gly Met Ala Leu Tyr Gly Thr Asn Val Tyr Phe Val  
 130 135 140

Ser Trp Asp Asn His Leu Val Ala Leu Asp Thr Ala Thr Gly Gln Val  
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Thr Phe Asp Val Asp Arg Gly Gln Gly Glu Asp Met Val Ser Asn Ser  
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Ser Gly Pro Ile Val Ala Asn Gly Val Ile Val Ala Gly Ser Thr Cys  
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Gln Tyr Ser Pro Phe Gly Cys Phe Val Ser Gly His Asp Ser Ala Thr  
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Gly Glu Glu Leu Trp Arg Asn Tyr Phe Ile Pro Arg Ala Gly Glu Glu  
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Gly Asp Glu Thr Trp Gly Asn Asp Tyr Glu Ala Arg Trp Met Thr Gly  
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Ala Trp Gly Gln Ile Thr Tyr Asp Pro Val Thr Asn Leu Val His Tyr  
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Gly Ser Thr Ala Val Gly Pro Ala Ser Glu Thr Gln Arg Gly Thr Pro  
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Gly Gly Thr Leu Tyr Gly Thr Asn Thr Arg Phe Ala Val Arg Pro Asp  
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Thr Gly Glu Ile Val Trp Arg His Gln Thr Leu Pro Arg Asp Asn Trp  
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Asp Gln Glu Cys Thr Phe Glu Met Met Val Thr Asn Val Asp Val Gln  
 305 310 315 320

Pro Ser Thr Glu Met Glu Gly Leu Gln Ser Ile Asn Pro Asn Ala Ala  
 325 330 335

Thr Gly Glu Arg Arg Val Leu Thr Gly Val Pro Cys Lys Thr Gly Thr  
 340 345 350

Met Trp Gln Phe Asp Ala Glu Thr Gly Glu Phe Leu Trp Ala Arg Asp  
 355 360 365

Thr Asn Tyr Gln Asn Met Ile Glu Ser Ile Asp Glu Asn Gly Ile Val  
370 375 380

Thr Val Asn Glu Asp Ala Ile Leu Lys Glu Leu Asp Val Glu Tyr Asp  
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Val Cys Pro Thr Phe Leu Gly Gly Arg Asp Trp Pro Ser Ala Ala Leu  
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Asn Pro Asp Ser Gly Ile Tyr Phe Ile Pro Leu Asn Asn Val Cys Tyr  
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Asp Met Met Ala Val Asp Gln Glu Phe Thr Ser Met Asp Val Tyr Asn  
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Thr Ser Asn Val Thr Lys Leu Pro Pro Gly Lys Asp Met Ile Gly Arg  
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Ile Asp Ala Ile Asp Ile Ser Thr Gly Arg Thr Leu Trp Ser Val Glu  
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Arg Ala Ala Ala Asn Tyr Ser Pro Val Leu Ser Thr Gly Gly Gly Val  
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Leu Phe Asn Gly Gly Thr Asp Arg Tyr Phe Arg Ala Leu Ser Gln Glu  
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Thr Gly Glu Thr Leu Trp Gln Thr Arg Leu Ala Thr Val Ala Ser Gly  
515 520 525

Gln Ala Ile Ser Tyr Glu Val Asp Gly Met Gln Tyr Val Ala Ile Ala  
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Glu Arg Val Asp Ser Thr Ala Ile Gly Asn Ala Val Tyr Val Phe Ala  
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Leu Pro Gln



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 <213> Gluconobacter oxydans

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 35 40 45

Glu Asn Tyr Arg His Ser Pro Leu Thr Gln Ile Thr Thr Glu Asn Val  
 50 55 60

Gly Gln Leu Gln Leu Val Trp Ala Arg Gly Met Gln Pro Gly Lys Val  
 65 70 75 80

Gln Val Thr Pro Leu Ile His Asp Gly Val Met Tyr Leu Ala Asn Pro  
 85 90 95

Gly Asp Val Ile Gln Ala Ile Asp Ala Lys Thr Gly Asp Leu Ile Trp  
 100 105 110

Glu His Arg Arg Gln Leu Pro Asn Ile Ala Thr Leu Asn Ser Phe Gly  
 115 120 125

Glu Pro Thr Arg Gly Met Ala Leu Tyr Gly Thr Asn Val Tyr Phe Val  
 130 135 140

Ser Trp Asp Asn His Leu Val Ala Leu Asp Thr Ala Thr Gly Gln Val  
 145 150 155 160

Thr Phe Asp Val Asp Arg Gly Gln Gly Glu Asp Met Val Ser Asn Ser

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Gln Tyr Ser Pro Phe Gly Cys Phe Val Ser Gly His Asp Ser Ala Thr		
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Gly Glu Glu Leu Trp Arg Asn Tyr Phe Ile Pro Arg Ala Gly Glu Glu		
210	215	220
Gly Asp Glu Thr Trp Gly Asn Asp Tyr Glu Ala Arg Trp Met Thr Gly		
225	230	235
Val Trp Gly Gln Ile Thr Tyr Asp Pro Val Gly Gly Leu Val His Tyr		
245	250	255
Gly Ser Ser Ala Val Gly Pro Ala Ser Glu Thr Gln Arg Gly Thr Thr		
260	265	270
Gly Gly Thr Met Tyr Gly Thr Asn Thr Arg Phe Ala Val Arg Pro Glu		
275	280	285
Thr Gly Glu Ile Val Trp Arg His Gln Thr Leu Pro Arg Asp Asn Trp		
290	295	300
Asp Gln Glu Cys Thr Phe Glu Met Met Val Ala Asn Val Asp Val Gln		
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Pro Ala Ala Asp Met Asp Gly Val Arg Ser Ile Asn Pro Asn Ala Ala		
325	330	335
Thr Gly Glu Arg Arg Val Leu Thr Gly Val Pro Cys Lys Thr Gly Thr		
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Met Trp Gln Phe Asp Ala Glu Thr Gly Glu Phe Leu Trp Ala Arg Asp		
355	360	365
Thr Ser Tyr Glu Asn Ile Ile Glu Ser Ile Asp Glu Asn Gly Ile Val		
370	375	380

Thr Val Asp Glu Ser Lys Val Leu Thr Glu Leu Asp Thr Pro Tyr Asp  
385 390 395 400

Val Cys Pro Leu Leu Leu Gly Gly Arg Asp Trp Pro Ser Ala Ala Leu  
405 410 415

Asn Pro Asp Thr Gly Ile Tyr Phe Ile Pro Leu Asn Asn Thr Cys Met  
420 425 430

Asp Ile Glu Ala Val Asp Gln Glu Phe Ser Ser Leu Asp Val Tyr Asn  
435 440 445

Gln Ser Leu Thr Ala Lys Met Ala Pro Gly Lys Glu Leu Val Gly Arg  
450 455 460

Ile Asp Ala Ile Asp Ile Ser Thr Gly Arg Thr Leu Trp Thr Ala Glu  
465 470 475 480

Arg Glu Ala Ser Asn Tyr Ala Pro Val Leu Ser Thr Ala Gly Gly Val  
485 490 495

Leu Phe Asn Gly Gly Thr Asp Arg Tyr Phe Arg Ala Leu Ser Gln Glu  
500 505 510

Thr Gly Glu Thr Leu Trp Gln Thr Arg Leu Ala Thr Val Ala Ser Gly  
515 520 525

Gln Ala Val Ser Tyr Glu Ile Asp Gly Val Gln Tyr Ile Ala Ile Gly  
530 535 540

Gly Gly Gly Thr Thr Tyr Gly Ser Phe His Asn Arg Pro Leu Ala Glu  
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Pro Val Asp Ser Thr Ala Ile Gly Asn Ala Met Tyr Val Phe Ala Leu  
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Pro Gln Gln

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<213> Gluconobacter oxydans

<220>

<221> SIGNAL

<222> (1) .. (23)

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Ala Asn Pro Pro Ala Gly Glu Trp Ile Asn Tyr Gly Gln Asn Gln Glu  
35 40 45

Asn Tyr Arg His Ser Pro Leu Thr Gln Ile Thr Ala Asp Asn Val Gly  
50 55 60

Gln Leu Gln Leu Val Trp Ala Arg Gly Met Glu Ala Gly Lys Ile Gln  
65 70 75 80

Val Thr Pro Leu Val His Asp Gly Val Met Tyr Leu Ala Asn Pro Gly  
85 90 95

Asp Val Ile Gln Ala Ile Asp Ala Ala Thr Gly Asp Leu Ile Trp Glu  
100 105 110

His Arg Arg Gln Leu Pro Asn Ile Ala Thr Leu Asn Ser Phe Gly Glu  
115 120 125

Pro Thr Arg Gly Met Ala Leu Tyr Gly Thr Asn Val Tyr Phe Val Ser  
130 135 140

Trp Asp Asn His Leu Val Ala Leu Asp Thr Ser Thr Gly Gln Val Val  
145 150 155 160

Phe Asp Val Asp Arg Gly Gln Gly Thr Asp Met Val Ser Asn Ser Ser  
165 170 175

Gly Pro Ile Val Ala Asn Gly Val Ile Val Ala Gly Ser Thr Cys Gln  
180 185 190

Tyr Ser Pro Phe Gly Cys Phe Val Ser Gly His Asp Ser Ala Thr Gly  
195 200 205

Glu Glu Leu Trp Arg Asn Thr Phe Ile Pro Arg Ala Gly Glu Glu Gly  
210 215 220

Asp Glu Thr Trp Gly Asn Asp Tyr Glu Ala Arg Trp Met Thr Gly Val  
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Trp Gly Gln Ile Thr Tyr Asp Pro Val Gly Gly Leu Val His Tyr Gly  
245 250 255

Thr Ser Ala Val Gly Pro Ala Ala Glu Ile Gln Arg Gly Thr Val Gly  
260 265 270

Gly Ser Met Tyr Gly Thr Asn Thr Arg Phe Ala Val Arg Pro Glu Thr  
275 280 285

Gly Glu Ile Val Trp Arg His Gln Thr Leu Pro Arg Asp Asn Trp Asp  
290 295 300

Gln Glu Cys Thr Phe Glu Met Met Val Val Asn Val Asp Val Gln Pro  
305 310 315 320

Ser Ala Glu Met Glu Gly Leu His Ala Ile Asn Pro Asp Ala Ala Thr  
325 330 335

Gly Glu Arg Arg Val Val Thr Gly Val Pro Cys Lys Asn Gly Thr Met  
340 345 350

Trp Gln Phe Asp Ala Glu Thr Gly Glu Phe Leu Trp Ala Arg Asp Thr  
355 360 365

Ser Tyr Gln Asn Leu Ile Glu Ser Val Asp Pro Asp Gly Leu Val His  
370 375 380

Val Asn Glu Asp Leu Val Val Thr Glu Leu Glu Val Ala Tyr Glu Ile  
385 390 395 400

Cys Pro Thr Phe Leu Gly Gly Arg Asp Trp Pro Ser Ala Ala Leu Asn

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Gly Glu Thr Leu Trp Gln Thr Arg Leu Ala Thr Val Ala Ser Gly Gln		
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Ala Ile Ser Tyr Glu Ile Asp Gly Val Gln Tyr Val Ala Ile Gly Arg		
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Gly Gly Thr Ser Tyr Gly Ser Asn His Asn Arg Ala Leu Thr Glu Arg		
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Gln Gln

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<220>  
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Leu Ala Asn Pro Pro Ala Gly Glu Trp Ile Asn Tyr Gly Arg Asn Gln  
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Glu Asn Tyr Arg His Ser Pro Leu Thr Gln Ile Thr Ala Asp Asn Val  
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Gly Gln Leu Gln Leu Val Trp Ala Arg Gly Met Glu Ala Gly Ala Val  
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Gln Val Thr Pro Met Ile His Asp Gly Val Met Tyr Leu Ala Asn Pro  
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Gly Asp Val Ile Gln Ala Leu Asp Ala Gln Thr Gly Asp Leu Ile Trp  
100 105 110

Glu His Arg Arg Gln Leu Pro Ala Val Ala Thr Leu Asn Ala Gln Gly  
115 120 125

Asp Arg Lys Arg Gly Val Ala Leu Tyr Gly Thr Ser Leu Tyr Phe Ser  
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Ser Trp Asp Asn His Leu Ile Ala Leu Asp Met Glu Thr Gly Gln Val  
145 150 155 160

Val Phe Asp Val Glu Arg Gly Ser Gly Glu Asp Gly Leu Thr Ser Asn  
165 170 175

Thr Thr Gly Pro Ile Val Ala Asn Gly Val Ile Val Ala Gly Ser Thr  
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Cys Gln Tyr Ser Pro Tyr Gly Cys Phe Ile Ser Gly His Asp Ser Ala  
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Thr Gly Glu Glu Leu Trp Arg Asn His Phe Ile Pro Gln Pro Gly Glu  
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Glu Gly Asp Glu Thr Trp Gly Asn Asp Phe Glu Ala Arg Trp Met Thr  
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Gly Val Trp Gly Gln Ile Thr Tyr Asp Pro Val Thr Asn Leu Val Phe  
 245 250 255

Tyr Gly Ser Thr Gly Val Gly Pro Ala Ser Glu Thr Gln Arg Gly Thr  
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Pro Gly Gly Thr Leu Tyr Gly Thr Asn Thr Arg Phe Ala Val Arg Pro  
 275 280 285

Asp Thr Gly Glu Ile Val Trp Arg His Gln Thr Leu Pro Arg Asp Asn  
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Trp Asp Gln Glu Cys Thr Phe Glu Met Met Val Ala Asn Val Asp Val  
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Gln Pro Ser Ala Glu Met Glu Gly Leu Arg Ala Ile Asn Pro Asn Ala  
 325 330 335

Ala Thr Gly Glu Arg Arg Val Leu Thr Gly Ala Pro Cys Lys Thr Gly  
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Thr Met Trp Ser Phe Asp Ala Ala Ser Gly Glu Phe Leu Trp Ala Arg  
 355 360 365

Asp Thr Asn Tyr Thr Asn Met Ile Ala Ser Ile Asp Glu Thr Gly Leu  
 370 375 380

Val Thr Val Asn Glu Asp Ala Val Leu Lys Glu Leu Asp Val Glu Tyr  
 385 390 395 400

Asp Val Cys Pro Thr Phe Leu Gly Gly Arg Asp Trp Ser Ser Ala Ala  
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Leu Asn Pro Asp Thr Gly Ile Tyr Phe Leu Pro Leu Asn Asn Ala Cys  
 420 425 430



Tyr Asp Ile Met Ala Val Asp Gln Glu Phe Ser Ala Leu Asp Val Tyr  
 435 440 445

Asn Thr Ser Ala Thr Ala Lys Leu Ala Pro Gly Phe Glu Asn Met Gly  
 450 455 460

Arg Ile Asp Ala Ile Asp Ile Ser Thr Gly Arg Thr Leu Trp Ser Ala  
 465 470 475 480

Glu Arg Pro Ala Ala Asn Tyr Ser Pro Val Leu Ser Thr Ala Gly Gly  
 485 490 495

Val Val Phe Asn Gly Gly Thr Asp Arg Tyr Phe Arg Ala Leu Ser Gln  
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Glu Thr Gly Glu Thr Leu Trp Gln Ala Arg Leu Ala Thr Val Ala Thr  
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Gly Gln Ala Ile Ser Tyr Glu Leu Asp Gly Val Gln Tyr Ile Ala Ile  
 530 535 540

Gly Ala Gly Gly Leu Thr Tyr Gly Thr Gln Leu Asn Ala Pro Leu Ala  
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Leu Pro Gln

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<211> 82

<212> DNA

<213> synthetic oligonucleotide

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